Letters to the Editor

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11

THERMOLUMINESCENCE AND PHOSPHORESCENCE SPECTRA OF SOME PURE AND IMPURITY ACTIVATED ALKALI HALIDES

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In order to have a better insight into the mechanism of luminescence emission the thermoluminescence spectra of NaCl, NaF, NaI, KI, LiCl and also those of thallium activated NaCl, NaBr, KI were studied. The measurements were confined in the spectral range 330 mμ—650 mμ.

Glow peaks were observed both above and below room temperature. On examination of the results it will be evident that most of the glow peaks observed are below room temperature. This is possibly because of the fact that the irradiation by 10 KV cathode rays had been done mostly at liquid oxygen temperature and so the high temperature glow peaks are either weak or absent.

All alkali halides have visible thermoluminescence emission. There may be different spectral bands in the same glow peak. The thermal activation energy for visible and ultra-violet emissions may or may not be different, i.e., there may be visible and ultra-violet emissions in the same glow peak or only visible or only ultra-violet emission.

Coincidence of thermal bleaching of colour centres and thermoluminescence has been reported by many workers (Dutton *et al.*, 1953 : Sharma 1952, 1956 , Halperin *et al*, 1957) and it is assumed that the two processes are closely related to each other. Both may have the same origin or one may be the cause of the other. In most cases it is observed that the samples are coloured on irradiation This colour disappears or changes at specific temperatures indicating a change in the absorption band.

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On incorporation of impurities into the host crystal there is generally an increase in the luminescence intensity ; trapping and luminescence centres are perturbed or destroyed and new centres created.

The observed emissions for the pure sample are assumed to be due to release of trapped electrons (holes) and its recombination with holes (electrons). In some cases there may be tunnelling of trapped electrons to trapped holes. Excitons probably play an intermediate role in the luminescence emission process.

TABLE I

Thermoluminescence spectra

Phosphor	Glow peak temperature in °K	Luminescence band maxima in m μ	Remarks
NaCl	160	432,540	After 10KV cathode ray irradiation at 90°K.
	232	484	,,
	545	416,519	After 10KV cathode ray irradiation at 300°K
NaI	164	522	After 10KV cathode ray irradiation at 90°K
NaF	185	403	,,
	290	415	,,
KI	104	568	,,
	190	570	,,
	320	478	,,
LiCl	118	423,528	,,
	226	400	,,
	314	547	,,
NaCl : Tl (2.5%)	163	416, 510	,,
	227	418,515	,,
	489	470	,,
	493	510	,,
NaBr : Tl (2.5%)	109	510	,,
	184	550	,,
	279	448	,,
	423	560	,,
KI : Tl (2.5%)	224	450	,,

TABLE II

Phosphorescence spectra

Phosphor	Luminescence band maxima in m μ	Remarks
NaCl	435, 540	After 10KV cathode ray irradiation at 90°K
KI	570	,,

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